size and placement of figure designations. The amended specification and new drawings do not contain new matter. Applicant respectfully requests the Examiner to approve these changes.

Applicant has also amended claims 1 through 4, 7, 9 through 11 and 14. In particular, claim 1 has been amended to recite "...rotor closed loops ... mounted on each end of the rotor ..." and "...stator closed loops .. angularly mounted on the stator adjacent each of the closed rotor loops ....". The recited structure has support in both the specification and drawings. Dependent claims 2 through 4 have been amended to recite the closed rotor and stator closed loops having an antecedent basis in amended parent claim 1. Dependent claim 7 has been amended to recite "...a plurality of closed stator loops ... mounted in the stator in the plane around the rotor ...." wherein the plane structure has an antecedent basis in the structure recited in parent claim 6. Dependent claim 9 has been amended to recite " ...a plurality of closed stator loops ... mounted on the stator adjacent ones of the rotor closed short-circuited loops in the planes perpendicular to the axis of the rotor.". wherein the recited "in the planes perpendicular to" has an antecedent basis in parent claim 8. Dependent claims 10 and 11 have been amended to recite the closed rotor and stator loops having an antecedent basis in amended parent claim 1. Independent claim 14 has been amended to recite "... a plurality of closed rotor short-circuited loops ... each of which are wound as a coil of wire around the rotor and positioned along the rotor in a circular plane perpendicular about an axis of the rotor ..." and "...a plurality of closed stator loops ... each angularly positioned in the planes round the rotor adjacent to a corresponding one of the closed rotor short-circuited loops ....". It is respectfully submitted that claims 1 through 4, 7, 9 through 11 and 14, particularly as amended, recite the structure of applicant's invented as set forth in the specification and drawings and do not constitute new matter.

The Examiner has objected to the drawings under 35 CFR 1.83(a) by stating that the drawings must show every feature of the invention specified in the claims. In one objection the Examiner states "apparatus for energizing the cooled closed rotor and stator loops as shown in claim 1 must be shown. The Examiner's attention is directed to Figs. 2 through 7 and especially to Fig. 3 of the drawing. Fig. 3 very clearly illustrates energizing apparatus in very clear detail. In addition to Fig. 3, Figs. 2 through 7 also show apparatus for energizing the cooled closed rotor and stator loops. It is respectfully submitted that the drawing shows this feature of applicant's invention. The Examiner further states the drawing must show "a cooling agent for cooling the closed rotor and stator closed loops". Superconductive bearing structures such as taught by applicant's specification and drawings operate in cryogenic atmospheres wherein cryogenic is defined by Webster's Ninth New Collegiate Dictionary as relating to very low temperature. The question is how do you show a

very low temperature in a drawing. For example, applicant's novel invention may find applications in outer space where the temperature is very low due to the absence of anything. How would one show a very cold nothing in a drawing? In other applications, various types of gases may be used to cool the atmosphere around the bearing. How would one show gases in a drawing? Chemical patents oftentimes due not require drawings because of the difficulty in showing these operations. Applicant has asked several intellectual property attorneys and patent draftsman how to show these types of functions. None had a perfect answer but several suggested showing temperature conditions in the drawings. Accordingly, Figs. 2, and 4 through 7 show temperature requirements, for example Fig. 2, $T_I < T_C$, that exists around the superconductive bearing components. The specification explains the application of these cooling temperatures in the operation of the disclosed bearing structures. Applicant respectfully submits that type of indication in the drawing meets the requirements of 37 CFR 1.83(a) and applicant's drawing properly shows the features. If the Examiner objects to this approach, applicant respectfully requests how this is done in prior art drawings such as showing the coldness of a surrounding atmosphere. It is noted that the art cited by the Examiner does not show these features. Applicant respectfully submits that the drawing is allowable under 37 CFR 1.83(a) in that it illustrates the features of applicant's invention.

The Examiner has rejected claims 1 through 11 and 17 through 22 under 35 U.S.C. 112, first paragraph. In rejecting claims 1 through 11 and 17, the Examiner states " ... the specification, while being enabling for 'loops formed of the zero electrical resistance material' at a temperature below a superconductivity transition temperature 'and angularly mounted on the stator', does not reasonably provide enablement for 'Loops formed of the zero electrical resistance material and angularly mounted on the stator'. The specification does not enable any person skilled in the art ... to make the invention commensurate in scope with these claims . Claim 1 recites ' loops formed of the zero electrical resistance material and angularly mounted on the stator'. It is not known what material having electrical resistance. Applicants respectfully traverse this rejection.

Applicant's amended claim 1 recites "... rotor closed loops formed of a material having zero electrical resistance at a temperature below a superconductivity transition temperature and which are mounted on each end of the rotor...." and "...stator closed loops formed of the zero electrical resistance material and angularly mounted on the stator adjacent each of the closed rotor loops ....". Applicant's specification very clearly states "... The closed stator loops 101, although not limited thereto, may be planar superconductive short-circuited coils wound from thin niobium-titanium or niobium-tin wire or similar superconductive material and are angularly mounted at ends of the stator around the closed rotor loops 202....".

Furthermore the specification teaches that "... Each closed rotor loop 202 is a planar short-circuited coil wound from thin niobium-titanium or niobium-tin wire...". It is respectfully submitted that the specification and drawing clearly teach the construction such that one skilled in the art to which applicant's invention relates is enabled to construct applicant's invention recited by amended parent claim 1 and further defined by dependent claims 2 through 11 and 17 through 22. It is to be recognized that over the lifetime of a patent new materials will be developed that will have zero electrical resistance at a higher temperature than today's materials such as thin niobium-titanium or niobium-tin wire. For example, new wires will be developed and maybe even thin film structures with higher superconductivity transition temperatures that can be used to make the closed rotor and stator loops recited in parent claim 1. Thus, it is proper to recite rotor and stator loops formed of a material having zero electrical resistance at a temperature below a superconductivity transition temperature which is within the teaching of applicant's specification and drawing. To limit this language may well harm the future of applicant's invention.

In view of the above set forth arguments and the amendment of independent claim 1, it is respectfully submitted that amended independent claim 1 and dependent claims 2 through 11 and 17 through 22 , further defining the structure set forth in parent claim are supported by the specification and particularly point out and distinctly claim the subject matter of applicants' invention as taught by the specification and drawing and enabling in view thereof and are clearly allowable under 35 U.S.C.112, second paragraph.

The Examiner has also rejected claims 1 through 11 and 17 through 22 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In rejecting claims 1 through 11 and 17 through 22, the Examiner states "...There insufficient antecedent basis for ...limitations ...." in independent claim 1and dependent claim 9. Applicant has amended claim 1 to recite "Apparatus for supporting a rotor with respect to a stator comprising rotor closed loops ... mounted on each end of the rotor, stator closed loops ... angularly mounted on the stator adjacent each of the closed rotor loops ...". It is respectfully submitted that the rotor and stator closed loops recited in lines 3 and 6 of claim 1 as above amended provide the antecedent basis for subsequent recitations of closed rotor and stator loops recited in lines 8 and 10 of claim 1 as above amended.

Applicant has also amended dependent claim 9 to recite " ... a plurality of closed stator loops ... each angular spaced and mounted on the stator adjacent ones of the rotor closed short-circuited loops in the planes perpendicular to the axis of the rotor....". It is to be noted that the antecedent basis for "the planes" recited in dependent claim 9 as above amended is recited in parent claim 8. It is believed that

dependent claim 9 as above amended clearly recites the structure of applicant's invention as set forth in the specification and drawing.

In view of the above amendments of independent parent claim 1 and dependent claim 9, it is respectfully submitted that amended parent claim 1 and dependent claims 2 through 11 and 17 through 22, further defining the structure of applicant's invention recited in amended parent claim 1, particularly point out and distinctly claim the subject matter of applicants' invention and are allowable under 35 U.S.C.112, second paragraph.

The Examiner has rejected claims 1 through 4, 6 through 8, 14, 21 and 22 under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 5,256,637 issued on October 26, 1993 to Rao (Rao). In rejecting independent claim 1 and dependent claims 2 through 4, 6 through 8, 14, 21 and 22 , the Examiner has stated Rao shows the apparatus recited by the rejected claims 1 through 4, 6 through 8, 14, and 21 and 22. Applicants respectfully traverse this rejection.

As set forth in the specification and in Fig. 1 of the drawing, applicant's novel invention has rotor closed loops mounted on each end of the rotor and stator closed loops angularly mounted adjacent each of the closed rotor loops. Claim 1 has been amended to recite these elements as "rotor closed loops ... mounted on each end of the rotor" and "stator closed loops ... adjacent each of the closed rotor loops". It is to be noted that claim 1 recites "...apparatus ... forming a bearing supporting a rotation of the rotor in an equilibrium stable free state within the stator". Independent claim 14 as above amemdd recites " ... a plurality of closed rotor ... loops ... wound ... around ... the rotor and positioned along the rotor ...." and "... a plurality of closed stator loops .. mounted on the stator and each angularly positioned in the planes around the rotor adjacent ... one of the closed rotor ... loops....". It is submitted that Rao does not teach this structure of applicant's invention as recited in amended claims 1 and 14. Rao illustrates in Fig. 1 a rotor structure mounted on one end of the rotor and a stator structure mounted opposite the end of the rotor. He does teach rotor closed loops mounted on each end of the rotor nor along the rotor as recited in amended claim 1 and independent claim 14 nor does he show in Fig. 1, as recited in applicant's amended claim 1 and independent claim 14, apparatus forming a bearing supporting a rotation of the rotor in an equilibrium stable free state within the stator. In contrast, the Rao bearing set forth in Fig. 1 has a rotor that appears to rotate adjacent to and outside the stator. Since the rotor appears to be the same size as the stator how could it rotate inside the stator. Fig. 2 of the Rao drawing may show a rotor within the stator but both loops appear to be mounted on the stator while the rotor merely is formed with laminations. In contrast to Figs. 2 and 3 of Rao, applicant's independent claim 1 recites rotor closed loops mounted on each end of the rotor and stator loops mounted on the stator adjacent each closed rotor loop. It is noted in Fig. 1 of Rao that the

magnetic field is parallel to the axis of the rotor bearing. It is also noted that the magnetic field in Rao's Fig. 2 appears to be rotational with the rotor. This is quite different than the field of applicant's novel apparatus.

In view of the above set forth arguments it is submitted that amended independent claim 1 and independent claim 14, and dependent claims 2 through 4, 6 through 8, 21 and 22, further defining the structure recited by amended claim 1, is neither taught nor anticipated by the Rao reference and claims 1 through 4, 6 through 8, 14, 21 and 22 are therefore clearly allowable under 35 U.S.C. 102(b) especially in view of Rao.

The Examiner has rejected dependent claims 5 and 9 through 12 under 35 U.S.C. 103(a) as being unpatentable over Rao in view of U. S. Patent No. 5,332,987 issued on July 26, 1994 to Michael J. Hennessy et al. (Hennessy). In rejecting claims 5 and 9 through 12 the Examiner states that " Regarding claim 5, Rao shows all the limitations ... except ... closed stator loops each comprise a planar short-circuited coil wound of the superconductive wire configured to have two non-equal circular-arc sides joined at the ends thereof by radial segments ... Hennessy shows the closed stator loops ... Since Rao and Hennessy ...are all from the same ... endeavor ... purpose disclosed by one inventor ... recognized in the pertinent art .... obvious ... to make the closed stator loops each with a planar short-circuited coil wound of the superconductive wire configured to have two non-equal circular-arc sides joined at the ends thereof by radial segments ....". The Examiner further states that Hennessy shows the features of applicant's dependent claims 9 through 11. Regarding claim 12, the Examiner states that " ... Rao does not show ... rotor having a pair of closed rotor loops and ... stator having closed ... loops configured to have two non-equal circular-arc sides joined at the ends thereof by radial segments .... Hennessy ... shows ... stator having pair of closed loops ... configured to have two non-equal circular-arc sides joined at the ends thereof by radial segments for ... controlling the orientation of the rotor .... obvious ... to make ... rotor with a pair of closed rotor loops and ... stator with closed stator loops configured to have two non-equal circular-arc sides joined at the ends thereof by radial segments as taught by Hennessy ....". These rejections are respectfully traversed.

Rao appears to teach a bearing structure and Hennessy appears to teach a suspension structure wherein both structures are different and perform different functions. Hennessy does not appear to disclose a bearing having a rotor or stator structure. Applicant respectfully asks if this is the same endeavor and is one skilled in the art of bearing structures presumed to be skilled in the art of suspension structures? Both have different structures and perform different functions. As earlier set forth, Rao also does not teach rotor closed loops mounted on each end of the rotor, nor stator closed loops angularly mounted on the stator adjacent each of the closed rotor loops

nor apparatus forming a bearing supporting a rotation of the rotor in an equilibrium stable free state within the stator as is recited in parent independent claim 1 and further defined in dependent claims 5 and 9 through 11 and as recited in independent claim 12. It is also noted that the Rao structure set forth in Fig. 1 of the Rao drawing generates an operating field parallel to the rotor while applicant's structure generates an operating field perpendicular to the rotor Applicant has carefully studied the Hennessy reference. Hennessy appears to teach a magnetic suspension system. The Hennessy apparatus, Fig. 1, appears to be two circular coils with a larger coil positioned below a smaller coil. As disclosed in the Hennessy specification and drawings the two circular coils generate a magnetic flux parallel to the axis of the coils to cause a suspension of a model above the coils. As set forth in Fig. 5 of the Hennessy drawing, control coils some of which have four sectors formed of a pie-shaped configuration, col. 6, line 59, are formed the smaller coil. Apparently these control coils generate fields that operate in conjunction the field generated by the large and small coils to position the model with respect to the suspension system. It is to be noted that Hennessy does not disclose or teach a rotor or stator as the term are used in bearings nor does the small coil rotate as does a bearing rotor. If Rao circular stator coils, Fig. 1 of the Rao drawing, could be replaced by the Hennessy pie-shaped coils the magnetic field generated thereby would appear to be parallel to the rotor whereas applicant's generate a magnetic field perpendicular to the rotor axis. As is taught by Hennessy would the coils need to be controlled by other apparatus to stabilize the Hennessy coil fields to maintain the Rao rotor in a stable position? It is obvious that if the Rao structure of Fig. 1 could be combined with the Hennessy coils, the combined structure does not teach appliclant's novel structure of amended parent claim 1 recited "... rotor closed loops ... mounted on each end of the rotor....". Nor is applicant's structure recited in amended parent claim 1 as "...stator closed loops ... angularly mounted on the stator adjacent each of the closed rotor loops ..." at each end of the rotor obvious of Rao in view of Hennessy. Similarly, applicant's structure claimed by parent claim 1 as "...apparatus for ... establishing magnetic linkages ... forming a bearing supporting a rotation of the rotor in an equilibrium stable free state within the stator.". It is obvious that the rotor set forth in Fig. 1 of the Rao drawing does not rotate within the stator and that even if the Hennessy coils could be combined with the Rao structure of Fig. 1 applicant's claimed structure for supporting a rotor rotation within the stator is non-obvious over Rao in view of Hennessy.

It is noted that two sets coils are mounted in on poles of the Rao stator and that no coils are mounted on the rotor set forth in Fig, 2 of the Rao structure. How could one set of the coils on round poles and a set of the Hennessy coils be mounted on pie-shaped poles. Even if this were possible, both sets of coils would be on the stator and the rotor would have no coils. Obviously, the Rao structure disclosed in Fig. 2 of the

Rao drawing in view of Hennessy does not disclose, teach or anticipate applicant's "...rotor closed loops ...". There are not rotor loops disclosed by either Fig. 2 of Rao or Hennessy. Since there are no closed rotor loops disclosed by Rao or Hennessy, or the combination, there obviously cannot be stator closed loops adjacent each closed rotor loop. Thus, it is respectfully submitted that independent parent claim 1 and dependent claims 5, and 9 through 11, further defining the structure recited by parent claim 1, respectively, are non-obvious in view of and particularly distinguish over Rao in view of Hennessy.

In view of the above set forth arguments, It is submitted that the structure recited in applicant's independent claim 12 as "...a rotor having a pair of closed rotor loops ... mounted on a shaft of the rotor at each end of the rotor .... a stator enclosing the rotor and having closed stator loops ... and ... apparatus for ... establishing magnetic linkages therebetween forming a bearing supporting a rotation of the rotor in an equilibrium stable state within the stator ...". is non-obvious in view of and particularly distinguish over Rao in view of Hennessy. It is noted that neither Fig. 2 of Rao, nor Hennessy, nor the combination thereof teach rotor coils mounted on the rotor. Hennessy does not even show a rotor and apparently does not need one in that it performs a different function than Rao.

It is respectfully submitted that independent claim 12 and dependent claims 5 and 9 through 11, further defining the structure and method of amended independent parent claim 1, respectively, are non-obvious in view of and particularly distinguish over Rao in view of Hennessey and claims 5, 9 through 12 are clearly allowable under 35 U.S.C. 103 in accordance with the principles of Graham vs. John Deere Co.

The Examiner has rejected claims 17 through 20 under 35 U.S.C. 103(a) as being unpatentable over Rao in view of U. S. Statutory Invention Registration No. H900 published on March 5. 1991 by Joseph T. Griffin (Griffin). In rejecting claims 17 through 20 the Examiner states that "... Rao shows all ... the limitations ... except for the rotor (or stator) loops each comprise a planar super conductive-shorted coil wound from thin niobium-titanium wire....". This rejection is respectfully traversed.

As above set forth, Rao does not teach rotor closed loops mounted on each end of the rotor, nor stator closed loops angularly mounted on the stator adjacent each of the closed rotor loops nor apparatus forming a bearing supporting a rotation of the rotor in an equilibrium stable free state within the stator as is recited in amended claim 1 that is parent to dependent claims 17 through 20. Applicant has carefully studied the Griffin reference.. Griffin appears to teach a magnetic repulsion ring structure, Fig. 2, wherein a stator 23 apparently mounts superconductive elements 25 to support and provide rotation of a ring 21. It is to be noted that the Griffin ring may in broad terms be a rotor but does not have rotor closed loops mounted on each end as is recited by applicant's claim 1. Since the Griffin ring does not have rotor closed loops at each

end it would appear that Griffin does not disclose stator closed loops angularly mounted on the stator adjacent each of the closed rotor loops at each end of the rotor. Thus, neither Rao nor Griffin teach the structure of applicant's invention recited by independent claim 1 and further defined by dependent claims 17 through 20. If Griffin could be combined with the Fig. 1 structure of Rao it is obvious that the combined structure would not have rotor closed loops mounted on each end of the rotor, nor stator closed loops angularly mounted on the stator adjacent each of the closed rotor loops at each end of the rotor, nor apparatus forming a bearing supporting a rotation of the rotor in an equilibrium stable free state within the stator as is recited in claim 1. Again it is noted that the operating field of the Rao and Griffin structure would appear to be parallel to the rotor while applicant's structure recited by parent claim 1 and further defined by dependent claims 17 through 20 generates an operating field perpendicular to the rotor. If the Griffin structure could be combined with the structure set forth in Figs. 2 and 3 of the Rao drawing, The combined structure obviously would still not teach nor anticipate applicant's claimed structure of rotor closed rotor loops mounted on each end of the rotor. Where are the rotor closed loops in Figs. 2 and 3 of the Rao reference and in the Griffin reference?

In view of the above set forth arguments, it is respectfully submitted that independent parent claim 1 and dependent claims 17 through 20, further defining the structure of parent independent claim 1, respectively, are non-obvious in view of and particularly distinguish over Rao reference in view of Griffin and are clearly allowable under 35 U.S.C. 103 in accordance with the principles of Graham vs. John Deere Co.

The Examiner has cited six United States patents by Seale et al., Boden et al., Mole et al., Iwasaki, Danby, and McMichael et al. U.S. Patent 6,131,459 issued to Seale et al. appears to disclose a linearized ultrasound beam aligment servo and U.S. Patent 3,650,581 issued to Boden et al. apparently discloses bearing systems. Mole et al. appear to disclose dynamoelectric machinery utilizing superconductive windings in U.S. Patent 4,058,746 and Iwasaki apparently discloses a light beam scanner in U.S. Patent 5,235,454. U.S. Patent 3,572,854 issued to Danby appears to disclose an electromagnetic suspension and positioning device and U.S. Patent No. 5,177,387 issued to McMichael et al. apparently discloses high temperature superconducting magnetic bearings. Applicant respectfully submits that although the references by Seale et al., Boden et al., Mole et al., Iwasaki, Danby, and McMichael et al. may be valid background information as to the state-of-the-art, they are too remote to be considered pertinent to the novel features of applicant's invention.

Applicants note the Examiner's remarks in regards to allowable subject matter.

In summary, applicants have amended the specification and submitted drawings amended to conform to the Office drafting requirements. Claims 1 through 4, 7, 9 through 11 and 14 have been amended. The Examiner has allowed claim 16. In view

of the amendment of claims 1 through 4, 7, 9 through 11 and 14 and the arguments herein set forth, applicants respectfully submit that claims 1 through 12, 14 and 17 through 22 are now allowable in addition to allowed claim 16. It is further believed that the amended drawing meets the requirements of 37 CFR 1.142(b). Favorable action in that regard and passage of this case to issue are earnestly solicited.

If any questions should arise with respect to the above remarks, or if it would in any way expedite the prosecution of this case, applicants' attorney would appreciate a telephone call by dialing Area Code (614)-888-6533.

Respectfully submitted

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